gently for some broad scheme of reform which may be introduced without danger, which will render all fellowships unnecessary, which will at once provide for the professional student and the original investigator, and that in such a way that an ignorant Parliament shall have no excuse for tampering with it. And if they do this quickly, they may do it before the Association for Academical Organisation has begun to stretch its limbs.

LONGMANS' TEXT-BOOKS OF SCIENCE

Electricity and Magnetism. By Fleeming Jenkin, F.R.SS. L. and E., M.I.C.E., Professor of Engineering in the University of Edinburgh. (London: Longmans and Co., 1873.)

THE author of this text-book tells us with great truth that at the present time there are two sciences of electricity—one that of the lecture-room and the popular treatise; the other that of the testing-office and the engineer's specification. The first deals with sparks and shocks which are seen and felt, the other with currents and resistances to be measured and calculated. The popularity of the one science depends on human curiosity; the diffusion of the other is a result of the demand for electricians as telegraph engineers.

The text-book before us, which is the work of an engineer eminent in telegraphy, is designed to teach the practical science of electricity and magnetism, by setting before the student as early as possible the measurable quantities of the science, and giving him complete instructions for actually measuring them.

"The difference between the electricity of the schools and of the testing office has been mainly brought about by the absolute necessity in practice for definite measurement. The lecturer is content to say, under such and such circumstances, a current flows or a resistance is increased. The practical electrician must know how much resistance, or he knows nothing; the difference is analogous to that between quantitative and qualitative analysis."

It is not without great effort that a science can pass out of one stage of its existence into another. To abandon one hypothesis in order to embrace another is comparatively easy, but to surrender our belief in a mysterious agent, making itself visible in brilliant experiments, and probably capable of accounting for whatever cannot be otherwise explained; and to accept the notion of electricity as a measurable commodity, which may be supplied at a potential of so many Volts at so much a Farad, is a transformation not to be effected without a pang.

It is true that in the last century Henry Cavendish led the way in the science of electrical measurement, and Coulomb invented experimental methods of great precision. But these were men whose scientific ardour far surpassed that of ordinary mortals, and for a long time their results remained dormant on the shelves of libraries. Then came Poisson and the mathematicians, who raised the science of electricity to a height of analytical splendour, where it was even more inaccessible than before to the uninitiated.

And now that electrical knowledge has acquired a commercial value, and must be supplied to the telegraphic world in whatever form it can be obtained, we are perhaps in some danger of forgetting the debt we owe to those mathematicians who, from the mass of their uninterpretable symbolical expressions, picked out such terms as "potential," "electromotive force" and "capacity," representing qualities which we now know to be capable of direct measurement, and which we are beginning to be able to explain to persons not trained in high mathematics.

Prof. Jenkin has, we think, made great progress in the important work of reducing the cardinal conceptions of electromagnetism to their most intelligible form, and presenting them to the student in their true connection.

The distinction between free electricity and latent, bound, combined, or dissimulated electricity, which occurs so frequently, especially in continental works on electricity, is not, so far as we can see, even alluded to in these pages; so that the student who takes Prof. Jenkin as his sole guide will not have his mind infected with a set of notions which did much harm in their day. On the other hand, terms which are really scientific—the use of which has led to a clearer understanding of the subject—are carefully defined and rendered familiar by well-chosen illustrations.

Thus we find that men of the most profound scientific acquirements were labouring forty years ago to discover the relation between the nature of a wire and the strength of the current induced in it. By the introduction of the term "electromotive force" to denote that which produces or tends to produce a current, the phenomena can now be explained to the mere beginner by saying that the electromotive force is determined by the alterations of the state of the circuit in the field, and is independent of the nature of the wire, while the current produced is measured by the electromotive force divided by the resistance of the circuit. To impress on the mind of the student terms which lead him in the right track, and to keep out of his sight those which have only led our predecessors, if not ourselves, astray, is an aim which Prof. Jenkin seems to have kept always in view.

To the critical student of text-books in general, there may appear to be a certain want of order and method in the first part of this treatise, the different facts being all thrown into the student's mind at once, to be defined and arranged in the chapters which follow. But when we consider the multiplicity of the connexions among the parts of electrical science, and the supreme importance of never losing sight of electrical science as a whole, while engaged in the study of each of its branches, we shall see that this little book, though it may appear at first a mighty maze, is not without a plan, and though it may be difficult to determine in which chapter we are to look for any particular statement, we have an excellent index at the end to which we may refer.

The descriptions of scientific and telegraphic instruments have all the completeness and more than the conciseness which we should look for from a practical engineer, and in a small compass contain a great deal not to be found in other books. The preface contains an outline of the whole subject, traced in a style so vigorous, that we feel convinced that the author could, with a little pains bestowed here and there, increase the force of his reasoning by several "Volts," and at the same time diminish by

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an "Ohm" or two the apparent stiffness of some of the paragraphs, so as to render the book more suitable to the capacities of the "Microfarads" of the present day.

ZOOLOGICAL MYTHOLOGY

Zoological Mythology; or, the Legends of Animals. By Angelo De Gubernatis, Professor of Sanskrit and Comparative Literature in the Istituto di Studii Superiori e di Perfezionamento at Florence. 2 vols. (London: Trübner and Co., 1872.)

THE claims which these volumes make to our consideration as students of Nature is that their stories of birds, beasts, and fishes are treated as being Natural History, not indeed in an ordinary, but in an extraordinary sense. It is asserted that they are descriptions in mythical language of the great phenomena of the earth and sky. To no small extent this assertion is indisputably true. In ancient poetry or story, it often happens that the teller of a myth incidentally lets us know what his underlying meaning is. Thus many a passage from the Veda shows that the minds of that poetic race of herdsmen, the ancient Aryans, were so moulded to the dominant ideas of the pasture and the stall, that they saw throughout all heaven and earth the analogues of their beloved herds. The winds chasing the clouds seem, to their fancy, bulls rushing among the cows. The sky is a beneficent cow, giving rain for milk. Indra, the Heaven-god, is a bull of bulls, whose horns are the thunderbolts, who smites in storm the mountain cavern where the cloud-cows are imprisoned, and sets them free. The sun may be fancied a herdsman, as in this ancient Vedic riddle: "I have seen a shepherd who never set down his foot, and yet went and disappeared on the roads; and who, taking the same and yet different roads, goes round and round amidst the worlds." Horses, too, as we moderns know by the classic chariot of the sun, figure in mythic astronomy. Prof. De Gubernatis gives us the beautiful little Russian nature-tale of the maiden Basiliça, who, on her way to the old witch's house, sees a black horseman all in black on a black horse, and then night falls; then she sees a white horseman on a white horse, and day dawns; then a red horseman on a red horse, and the sun rises. The story has been told already in England, but deserves telling again for its absolute certainty of meaning, which hardly requires the old witch's explanation that the black, white, and red horsemen are mythic personifications of night, day, and sun. If, then, we meet with stories very like unquestionable nature-myths, there is a strong case for the mythologists who say these stories are also nature-myths, whose original meaning has been forgotten, so that they have fallen into the state of mere fanciful tales. Thus, in an Esthonian story quoted by our author, this same notion appears of the three horsemen who are personifications of the great periods of light and darkness. The hero comes to deliver the princess from the glass mountain where she sleeps, and he comes dressed first in bronze colour on a bronze-coloured horse, next in silver on a silver-coloured horse, and lastly in golden garb on a golden horse. This certainly looks like a story suggested by the victorious noonday sun coming at last with glowing rays to accomplish the task he had failed to perform in darkness or twilight, to deliver the Spring from the icy fortress of Winter, or, as our nursery tale has it, to awaken the Sleeping Beauty in the Palace where the spell of Winter has bound her and hers in numbness and silence. *Valeat quantum.*

The scientific study of mythology will be advanced by the collection of mythic episodes made with extraordinary earning by Prof. De Gubernatis. It is a museum of material, and a good many of the author's rationalisations of old legends seem plausible. For instance, he adds new versions to the group of tales (to which belong "Tom Thumb" and "Little Red Ridinghood") in which the night is dramatised as a wolf or other monster, which swallows and afterwards releases the hero who represents the sun or day. He goes on to interpret in the same way the stories where the hero is shut up in the sack or chest and cast into the water, but comes safe to land after all, as the sun, shrouded in the shades of evening, crosses the ocean and reappears at morning. The value of such interpretations as these depends, of course, on careful comparison of evidence. Unhappily, however, the general method of the book is unscientific. The author has no strict logic in him. His argument is substantially this: natural phenomena often suggest to tale-tellers or poets ideas which they shape into cock-and-bull stories; therefore, the way to interpret cock-and-bull stories in general is to guess at some natural phenomena which may have suggested them. The consequence of such a principle of interpretation is a network of tangled guesses, which often only mystify the legends they pretend to explain. The ease with which such a method can be applied, and the worthlessness of its results when it is applied, are shown in the author's treatment of common proverbs. As a rule, proverbs really require no explanation; their origin is intelligible at a glance, as it always was; we feel we might have made them ourselves, if we had been clever enough, and proverb-making had been still in fashion. Not so our author. "The black cow gives white milk" means to him that the night produces the dawn, or the moon, or the Milky Way (we are allowed to take our choice which we like best). "Though the cow's tail waggles, it does not fall," seems to us to require no recondite explanation; but to Prof. De Gubernatis it connects itself with a whole fabric of speculations about the night-monster running after the dawn-cow's tail to clutch it. On the whole, we can hardly better characterise the work before us, in its combination of curious material and absurd argument, than by quoting the following piece of amazing nonsense, ending in a parenthesis with a little fact which will be new to most of our readers, and which shows that modern Italy has so kept up old classic customs, that the proverb "Ab ovo usque ad mala" still explains itself, just as we might now say, "From soup to dessert":—

> "The hen of the fable and the fairy tales, which lays golden eggs, is the mythical hen (the earth or the sky) which gives birth every day to the sun. The golden egg is the beginning of life in Orphic and Hindoo cosmogony; by the golden egg the world begins to move, and movement is the principle of good. The golden egg brings forth the luminous, laborious, and beneficent day. Hence it is an excellent augury to begin with the egg, which represents the principle of good, whence the equivocal Latin proverb, 'Ad ovo ad malum,' which signified 'From good to evil,' but which properly meant 'From

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